ENGINEERING FORUM TELECONFERENCE MINUTES
May 3, 2000

TECHNICAL ISSUE: THOUGHTS ON DESIGN OF GROUND WATER TREATMENT PLANTS

Ed Mead (USACE) discussed his draft "Thoughts on Design of Ground Water Treatment Plants" (attached at the end of these minutes) as a basis for an Engineering Forum issue paper. He indicated that many pump-and-treat systems are designed with pre-construction contaminant concentrations and ground water flows in mind. However, contaminant concentrations often drop off quickly after construction and treatment processes may not be needed. The Forum should consider developing an issue paper on this topic to determine whether longer pumping tests are needed prior to constructing pump-and-treat systems. This issue paper could include an analysis of different kinds of sites, including PRP and military sites.

Trish Erickson (NRMRL/Cincinnati) reported that TIO recently published a paper titled "Groundwater Cleanup: Overview of Operating Experience at 28 Sites," which examined operating experiences at 28 sites across the United States where completed or ongoing ground water cleanup programs are in place (www.clu-in.org/download/remed/ovopex.pdf). This document includes data on pumping rates and contaminant concentrations and could be used as a starting point for developing the issue paper. The Forum could also review the RODs for these 28 sites to collect additional information on the design expectations for the treatment systems being used at these sites.

Dave Reisman reported that NRMRL-Cincinnati may receive funding for a summer student intern, who could help with this paper by obtaining information from a CD-ROM that contains the complete RODs for all sites. The intern also could coordinate with Kathy Yager (TIO) on data collection. Erickson noted that TIO has received funding for a summer intern, who also could work on this project. If the summer intern could not help, the Forum could use a contract vehicle to collect the information. Dave Reisman agreed to update the Forum on next steps for this topic on the June conference call.

FOLLOW-UP FROM LAST WEEK'S MEETING

JoAnn Cola (Region 9) reported that Rich Steimle (TIO) wants the Forum to update his Regional Division Directors and Branch Chiefs mailing list. Cola agreed to ask Steimle for an electronic version of the most updated list and to forward it to all Forum members sometime next week.

UPDATE ON CURRENT PROJECTS

Landfill Reuse Roundtable Minutes

EMS agreed to forward the paper from the Landfill Reuse Roundtable via e-mail to the Forum members and Forum friends. EMS also will find out when it can be posted on the Engineering Forum website.

USACE Design Guides

Comments are due on the USACE Design Guides.

Assembled Chemical Weapons Program

All Forum members have been asked by John Kingscott (TIO) to review a paper on the Assembled Chemical Weapons Program. A copy of this paper will be available for review soon and comments should be sent directly to Kingscott with a *cc:* to the Forum co-chairs. Kingscott will extend the comment period if needed. Expect to receive an electronic version of this paper from EMS.

Draft Oxygenates Paper

Erickson reported that she has reviewed a preliminary draft of the oxygenates issue paper, and that it looks good and includes the type of information that the Forum wants. Currently, the paper lacks data for some of the contaminants, but the final draft will include information on the physical and chemical properties of various compounds. The paper will include six tables for six different treatment approaches, and each of these tables will include data from case. The first draft of this paper should be available to the Forum in three weeks. Erickson asked that Forum members who know of pump-and-treat projects using oxygenated compounds in their Regions contact her to discuss whether the data can be incorporated into the paper.

MTBE

Erickson reported that a fair amount of data on MTBE remediation is available, but that membrane and resin treatments have not been used often for remediation of MTBE (probably due to their expense). However, any Forum member with knowledge of the application of these treatments should contact Erickson. Camille Hueni (Region 6) suggested consulting the www.mtbepollution.com. Cola added that Lawrence Livermore National Laboratory has a website that includes a paper on MTBE from the American Chemical Society.

Construction Equipment Manual

At the Spring 2000 TSP meeting, Steve Nussbaum (Illinois EPA) distributed a table of contents and a sample page of the Construction Equipment Manual. Nussbaum plans to publish this document in an electronic format that will include pictures, brief descriptions, and links to additional information. Hueni agreed to ask Nussbaum to send a copy of the file to all Forum members. She added that the Forum needs to discuss how this can be maintained as a living document, adding that it is not known what the proposed format for distribution of the manual was but distributing a CD-ROM may not provide the flexibility needed for easily keeping the manual up to date.

It was suggested that the manual be placed on the Engineering Forum's web page, so that the Forum can take credit for it. Nussbaum is open to comments on the manual; however, anyone wishing to send him comments should do so soon. It was acknowledged that Nussbaum has done an excellent job of developing this concept.

Screening Data Collection Paper

The Screening Data Collection Engineering Bulletin was scoped out at the Spring TSP meeting, and a conference call to discuss this bulletin further is scheduled for May 31 at 1:00 EDT. JoAnn Camacho will chair this call. The purpose of the paper is to provide physical, geochemical, and water chemistry data to facilitate technology selection. The paper will include data tables, analysis, applications of technologies, and cost and time savings information. Rich Ho (Region 2), Jim Harrington (NYSDEC) Camacho, Mead, and Hueni are working on the data tables. Other Forum members interested in working on this document should contact JoAnn Camacho. The workgroup hopes to have a draft of some of the tables and subsections of this bulletin available in the middle of May so they can be discussed on the call on the 31st.

It was suggested that the workgroup use the FRTR manual to find additional information on technologies. Camacho said that the workgroup needs to decide how much detail it wants to include about the technologies before proceeding.

5-Year Review/RSE Paper with USACE

The workgroup for the 5-Year Review/RSE issue paper has not yet scoped out the paper, but needs to move forward soon. Kinser reported that the workgroup has discussed that this effort would potentially be a promotional effort to publicize the usefulness of the 22 Corps of Engineers checklists not only for 5 year reviews but any time that a technology was being considered, re-considered or evaluated.

SVE Off-Gas Paper with ORD

Erickson reported that Jim Cummings (TIO) is working on a paper on SVE optimization and closing procedures and a paper on off-gases, which is due in two weeks. Cummings would like the Forum to poll their regions about projects where SVE is being used with conventional off-gas or other innovative treatments, because the literature does not cover all the current projects. After the first draft paper is completed, Erickson will request that Cummings to e-mail the Forum with the information he is seeking.

Long-Term Performance of Containment Systems With ORD

Cola reported that Ken Skahn (OERR) is examining the failure of clay caps; comparing the performance of clay caps with other cap systems; looking at sites that have 5-year reviews due soon; and evaluating how remediation systems are holding up. Erickson reported that Skahn also is interested in doing forensics research on clay caps.

Co-chair Meeting with Walt Kovalick to Discuss Budget Cuts Hitting the Forum

Cola reported that the co-chairs met with Walt Kovalick (Director of TIO) to discuss budget cuts that may affect the Forum. During this meeting, the co-chairs emphasized the importance of semi-annual meetings in maintaining the momentum of Forum projects. From this meeting, it became clear that holding semi-annual meetings will require more involvement from Forum members in planning these meetings without contractor support. Therefore, the Engineering Forum will need volunteers to plan the Engineering Forum's portion of the fall meeting, which will be led by the Fed Facility Forum may be held in Charleston or San Diego, both of which are Navy venues. Tony Holoska (Region 5), Bill Rothenmeyer (Region 8), Nate Nemani (Region 5), and Steve Kinser (Region 7) volunteered to plan the meeting. Cola will send an e-mail soliciting additional volunteers for planning the next meeting.

Holoska asked whether the National Ground Water Association (NGWA) still intends to offer training courses at the meeting. Hueni reported that the length of the NGWA courses is negotiable. She added that at this time, Kovalick does not plan on paying for all the Forum members attend these courses. The co-chairs are waiting to hear from Steimle the final decision on this issue, however.

Meeting with Bob Hall: Chief of Corrective Action in RCRA

At the Spring TSP meeting, the Forum met with Bob Hall, Chief of Corrective Action in RCRA, who pledged to designate a Headquarters contact person for each Forum. He also indicated his awareness of RCRA's reduced resources and how they impact the Forums. Hueni noted that the Forum conveyed to Hall how its work translates well into RCRA's corrective action activities and that Hall wants to help the Forum if he can. Hall agreed to talk with all RCRA Division Directors and to get the Forum involved in RCRA document reviews.

"Site Cooperation"

During the Spring TSP meeting, Ken Skahn suggested setting up a program that would connect people who are implementing new technologies at sites for the first time with other people who already have worked with this technology. The Forum agreed that this was a good idea and suggested identifying people in their Regions who would be interested in participating in this program.

OTHER ISSUES

Camille Hueni noted that all Forum members should have received an e-mail from Dan Powell (TIO) regarding funding availability to advance OSWER's project entitled "Measurement and Monitoring Technologies for the 21st Century" ($21M^2$). However, this message may need to be forwarded to Regional Section Chiefs within each office.

NEXT ENGINEERING FORUM TELECONFERENCE CALL

The next Engineering Forum conference call is scheduled for Wednesday, June 7, 2000, from 12:30-2:00 pm EDT. The call in number is (202) 260-7280, and the access code is 8878#. Steve Kinser will be the co-chair lead for the call. Region 6 will lead the technical topic.

ATTENDEES

Tony Holoska, Region 5
Nate Nemani, Region 5
Camille Hueni, Region 6
Susan Webster, Region 6
Steve Kinser, Region 7
Nancy Morlock, Region 8
Holly Fliniau, Region 8
Bill Rothenmeyer, Region 8
Jo Ann Cola, Region 9
Cynthia Wetmore, Region 9
Neil Thompson, , Region 10
David Reisman, NRMRL-Cincinnati
Trish Erickson, NRMRL-Cincinnati
JoAnn Camacho, HQ/OERR/ERT
Dave Jaros, USACE
Ed Mead, USACE
Jim Harrington, NYSDEC
Edie Findeis, EMS

DRAFT

THOUGHTS ON DESIGN OF GROUND WATER TREATMENT PLANTS

INTRODUCTION:

Many pump and treat systems have been, in retrospect, over designed with respect to chemical influent loading and/or total influent ground water flow rate. Both problems can usually be attributed to a lack of sufficient hydrologic characterization of the aquifer. Many plants are designed hydraulically and chemically based on monitoring well data, and slug tests that provide only crude estimates of flow and concentrations that will go to the plant.

DISCUSSION:

Monitoring well samples and slug tests represent only a very small volume of the aquifer and even averaging data from a number of wells does not provide sufficient characterization for the designer. One or more treatment processes are sometimes added unnecessarily to the treatment train based on data from a limited number of higher than normal values often associated with hotspots which, results in an overly conservative treatment facility design. Hydraulic and contaminant design loadings that are too conservative result~~ing~~ in an expensive facility that is extremely difficult to operate effectively or efficiently. Using unduly conservative data can skew design requirements and often result in selection of more expensive and complex process components. When more realistic data are obtained through pump testing, the most efficient and cost effective unit processes selected may be entirely different.

The primary discrepancy to proper treatment facility design is the lack of a full scale pump test for hydrologic characterization. ~~Carrying out~~ Pump tests are often carried out adjacent to the contaminated area to avoid having to deal with investigation derived waste (IDW). Typically HTRW extraction wells pump in the 5-100 GPM range. In an unconfined, uncontaminated area of an aquifer, most experts recommend a 72 hour pump test. Pumping 72 hours at 10 GPM from a contaminated aquifer for three days would generate approximately 45,000 gallons of IDW, and ten times that would be generated at 100 GPM. A pump test should be considered a predesign study to be used to establish basic criteria needed to design an extraction system. Many times regulatory agencies are amenable to disposing of limited quantities of water to a local POTW or by temporarily treating on site until the full scale system is built.

The pump test is needed to determine contaminant extent, volume and concentration over time as well as aquifer hydraulic characteristics. Liquid phase transport recognizes that the limiting factor is often desorption and ultimately cleanup time is determined by the number of pore volumes that flow through the contaminated zones which is based upon the hydraulic characteristics of the aquifer material. Even though pump and treat remains a common remedy for ground water cleanup projects, and full scale pump test data is critical for a successful design, it is rarely done.

As a rule the chemical data from monitoring wells is not adequate to characterize the chemical influent to the treatment plant. The same pump test can be used to obtain the chemical data necessary for an efficient, cost effective treatment facility design. Ideally the pump test well should be similar in configuration (screen diameter, length, slot size, etc.) to the final extraction wells. Extraction wells will draw in water from a much larger volume and are going to have greater heterogeneity of chemical loading, including significant dilution, by drawing in cleaner water in some parts of its capture zone. The result often is that the long-term pump test chemical data gives a more realistic estimate of the chemical influent for the plant.

DRAFT RECOMMENDATIONS:

Prior to designing a pump and treat system, a pump test must be carried out to determine both the chemical loading and hydraulic factors for wells in the system. Pump tests in an unconfined aquifer should be run for a minimum of 72 hours to help determine boundary conditions. In addition to the traditional hydrologic data, it is suggested that water samples be collected at 0, 1, 2, 4, 8, 16, 24, 48, and 72 hours to be analyzed for the contaminants of concern and potential process interferences (e.g. reduced iron) at the site. This sampling frequency should be adequate in most cases to define whether or not the chemical concentrations have decreased to approach a constant level, which will most likely be sustained in the plant. Under certain conditions it may be necessary to extend the test longer (field screening data may be useful to evaluate the end point) to see this decline in concentrations.

This pump test and corresponding chemical loading evaluation should lead to a plant design that more closely conforms with site conditions and greatly reduces the likelihood of significant over design in these systems.